



April 7, 2016

Ms. Michelle Kaysen  
USEPA Region 5, Mail Code LU-9J  
77 West Jackson Boulevard  
Chicago, IL 60604

RE: First Quarter 2016 Sentinel Well Monitoring Summary Report, Hartford Petroleum Release Site,  
Hartford, Illinois

Dear Ms. Kaysen:

Trihydro Corporation (Trihydro) has prepared the following letter report describing groundwater monitoring activities conducted by Apex Oil Company, Inc. (Apex) for the five sentinel groundwater monitoring wells located at the Hartford Petroleum Release Site (Hartford Site). On September 18, 2014, the United States Environmental Protection Agency (USEPA) sent Apex and the Hartford Working Group a letter describing reassignment of activities at the Hartford Site, which included Apex resuming groundwater monitoring within the sentinel well network beginning in the first quarter 2015. Groundwater monitoring activities were performed by Apex on March 29, 2016.

## BACKGROUND

The five sentinel wells (HMW-25 through HMW-29) were installed in 2003 to provide an early indication of petroleum hydrocarbon migration towards the well head protection area for the Hartford drinking water well field (McGuire et al. 2001). As shown on Figure 1, the well head protection area is located approximately **nonresponsive** of petroleum hydrocarbons present in soil and groundwater attributed to historical releases from the refineries and petroleum storage facilities situated to the north and east of the Village of Hartford. The sentinel groundwater monitoring wells are located between the well head protection area and the distribution of petroleum hydrocarbons beneath the Hartford Site.

The Village of Hartford drinking water wells are screened within deeper portions of the Main Sand stratum because of the high groundwater transmissivity within this aquifer. The two most recently installed groundwater production wells **nonresponsive** were installed by the Village of Hartford to a total depth of approximately 105 ft-bgs and were constructed with between 20 and 35 feet of screen.

In the absence of groundwater pumping (rates exceed 10,000 gallons per minute) by the various facilities around the Hartford Site (e.g., British Petroleum, Phillips 66, Premcor, etc.), groundwater flow within the Main Sand under typical river stage conditions may flow to the south and southwest, parallel to surface water flow within the Mississippi River (USEPA 2010). However, natural flow of groundwater in the Main Sand aquifer has been altered beneath the Village of Hartford such that during periods of high river stage, groundwater flow is generally towards the east to northeast due to recharge from the river and bank storage within the Main Sand. During moderate river elevations, the groundwater flow direction is northward and during low river stages, groundwater flow trends westerly to northwesterly.



## **GROUNDWATER ELEVATIONS**

The depth to groundwater within the sentinel wells is measured quarterly as part of the site-wide fluid level gauging event performed at the Hartford Site. In addition, the depth to water is gauged immediately prior to purging and groundwater sample collection. The depth to groundwater was measured using a Solonist™ water level indicator, decontaminated prior to and immediately following gauging within each sentinel well. The water level indicator is decontaminated using isopropyl alcohol in accordance with Hartford Working Group Standard Operating Procedure No. 05 (Equipment Decontamination). The depth to groundwater measurements were made from the pre-marked (surveyed) measuring point on the north side of the well casing. Fluid level measurements were recorded on digital field forms using Trihydro's environmental information management system.

Table 1 summarizes the depth to water measurements and groundwater elevations measured within the sentinel wells from April 2015 through March 2016. Based on the quarterly fluid level gauging event in January 2016, Figure 2 indicates that groundwater flow during the first quarter was generally to the northeast, and the sentinel wells and Village of Hartford Production Wells are situated up-gradient of the distribution of petroleum hydrocarbons attributed to the Hartford Site.

## **GROUNDWATER SAMPLING PROCEDURES**

Groundwater was purged and samples collected using a low-flow (minimal drawdown) groundwater sampling methodology (Puls and Barcelona 1996). A ProActive™ Monsoon® submersible pump with a flow controller and dedicated low-density polyethylene (LDPE) tubing was utilized for purging and sample collection. The pumps were installed so that the intake was located approximately five feet below the saturated portion of the screened interval. The flow rate was maintained between 0.1 and 0.5 liters per minute to minimize drawdown and to avoid undue pressure, temperature, or other physical disturbances to groundwater over the sampling interval.

Prior to purging each sentinel well, the submersible pump was decontaminated in the following manner:

- External surfaces were brushed free of loose material, washed with a phosphate free decontamination solution and potable water, and rinsed with deionized or distilled water.
- Internal surfaces were cleaned by placing the pump in a 5-gallon bucket containing a phosphate-free decontamination solution and allowing the pump to operate for several minutes to circulate the decontamination solution through the impellers and pump housing. The pump was then rinsed by circulating with potable water, followed by a distilled water rinse.

Decontamination fluids and purge water were collected and disposed of in accordance with state and federal regulations.



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## **Field Analyses**

Field parameters (including temperature, pH, specific conductance, dissolved oxygen, oxygen reduction potential, and turbidity) were measured using a Horiba™ U-52® multi-parameter meter over five-minute intervals during purging to ensure a representative groundwater sample was collected. The multi-parameter water quality meters were calibrated daily, in accordance with the manufacturer's guidelines, using a factory-prepared calibration standard. In general, the following stabilization criteria were achieved over three successive readings before collecting groundwater samples:

- Temperature:  $\pm 3\%$
- pH:  $\pm 0.1$
- Specific Conductance:  $\pm 3\%$
- DO:  $\pm 0.3$  milligrams per liter
- ORP:  $\pm 10$  millivolts
- Turbidity:  $\pm 10\%$  or  $<10$  nephelometric turbidity units

## **Sample Collection and Analyses**

Once the stabilization criteria were achieved, groundwater samples were collected in 40-milliliter glass vials preserved with hydrochloric acid and immediately placed in a cooler with ice. Groundwater samples were carefully filled during sample collection to minimize headspace and agitation. The lids on each sample container were tightly secured. The sample labels and chain of custody were filled out completely including sample identification, date and time of collection, project name, client name, field personnel initials, requested analyses, and preservation methods.

A blind duplicate sample was collected from monitoring well HMW-029 during the first quarter 2016 monitoring event. An equipment blank was collected following sampling activities at HMW-029.

The samples were collected and analyzed in general accordance with the Test Methods for Evaluating Solid Waste (U.S. EPA 1997). The groundwater samples collected from the sentinel wells were transported separate from other samples to TekLab, Inc. located in Collinsville, Illinois for analysis of benzene, toluene, ethylbenzene, xylenes (BTEX), and methyl tert-butyl ether (MTBE) via USEPA Method 8260B.

## **GROUNDWATER ANALYTICAL RESULTS**

A summary of the groundwater analytical results are provided in Table 2. The laboratory analytical results are included in Attachment A. Concentrations of BTEX and MTBE were below the laboratory reporting limits within all of the groundwater samples collected from the sentinel wells during the first



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quarter 2016. The blind duplicate collected at HMW-029 and the equipment blank collected following sampling activities at HMW-029 were below the laboratory reporting limits for BTEX and MTBE.

The first quarter 2016 monitoring results indicate that groundwater within the Main Sand stratum is not flowing from the Hartford Site towards the sentinel monitoring wells, nor the Village of Hartford well head protection area. Furthermore, dissolved phase petroleum hydrocarbons were not detected in groundwater samples collected from the sentinel wells during this monitoring event. If you have any questions regarding the first quarter 2016 sentinel well monitoring results, please contact me at (513) 429-7452.

Sincerely,  
Trihydro Corporation

Todd Aseltyne, P.G.  
Geologist

24S-008-001

Attachments

cc: James F. Sanders, Apex Oil Company, Inc.  
Tom Miller, Illinois Environmental Protection Agency  
Chris Cahnovsky, Illinois Environmental Protection Agency

## TABLES

**TABLE 1. SENTINEL WELL FLUID LEVEL GAUGING RESULTS  
HARTFORD PETROLEUM RELEASE SITE, HARTFORD, ILLINOIS**

| Location | Date       | Measuring Point<br>Elevation<br>(ft-amsl) | Depth to Water<br>(ft-bmp) | Water Elevation<br>(ft-amsl) |
|----------|------------|---|----------------------------|------------------------------|
| HMW-025  | 4/06/2015  | 427.45                                    | 29.38                      | 398.07                       |
|          | 5/27/2015  |   | 26.14                      | 401.31                       |
|          | 7/22/2015  |   | 15.20                      | 412.25                       |
|          | 9/22/2015  |   | 25.51                      | 401.94                       |
|          | 10/13/2015 |   | 26.95                      | 400.50                       |
|          | 12/15/2015 |   | 24.64                      | 402.81                       |
|          | 1/06/2016  |   | 15.22                      | 412.23                       |
|          | 3/29/2016  |   | 25.09                      | 402.36                       |
| HMW-026  | 4/06/2015  | 425.20                                    | 26.88                      | 398.32                       |
|          | 5/27/2015  |   | 24.61                      | 400.59                       |
|          | 7/22/2015  |   | 13.92                      | 411.28                       |
|          | 9/22/2015  |   | 22.19                      | 403.01                       |
|          | 10/13/2015 |   | 23.40                      | 401.80                       |
|          | 12/15/2015 |   | 22.57                      | 402.63                       |
|          | 1/06/2016  |   | 14.54                      | 410.66                       |
|          | 3/29/2016  |   | 22.45                      | 402.75                       |
| HMW-027  | 4/07/2015  | 430.51                                    | 31.72                      | 398.79                       |
|          | 5/27/2015  |   | 29.71                      | 400.80                       |
|          | 7/21/2015  |   | 19.40                      | 411.11                       |
|          | 9/22/2015  |   | 26.88                      | 403.63                       |
|          | 10/14/2015 |   | 28.13                      | 402.38                       |
|          | 12/15/2015 |   | 27.61                      | 402.90                       |
|          | 1/06/2016  |   | 19.54                      | 410.97                       |
|          | 3/29/2016  |   | 27.24                      | 403.27                       |
| HMW-028  | 4/07/2015  | 430.97                                    | 31.41                      | 399.56                       |
|          | 5/28/2015  |   | 29.12                      | 401.85                       |
|          | 7/21/2015  |   | 19.33                      | 411.64                       |
|          | 9/22/2015  |   | 27.28                      | 403.69                       |
|          | 10/14/2015 |   | 28.62                      | 402.35                       |
|          | 12/15/2015 |   | 27.38                      | 403.59                       |
|          | 1/06/2016  |   | 19.11                      | 411.86                       |
|          | 3/29/2016  |   | 27.15                      | 403.82                       |
| HMW-029  | 4/07/2015  | 429.13                                    | 29.88                      | 399.25                       |
|          | 5/28/2015  |   | 28.25                      | 400.88                       |
|          | 7/21/2015  |   | 18.85                      | 410.28                       |
|          | 9/22/2015  |   | 25.51                      | 403.62                       |
|          | 10/14/2015 |   | 26.76                      | 402.37                       |
|          | 12/15/2015 |   | 26.24                      | 402.89                       |
|          | 1/06/2016  |   | 18.88                      | 410.25                       |
|          | 3/29/2016  |   | 25.52                      | 403.61                       |

Notes:

ft-amsl - feet above mean sea level

ft-bmp - feet below measuring point

**TABLE 2. SENTINEL WELL GROUNDWATER ANALYTICAL RESULTS SUMMARY  
HARTFORD PETROLEUM RELEASE SITE, HARTFORD, ILLINOIS**

| Location                      | Date     | Benzene<br>(µg/L) | Ethylbenzene<br>(µg/L) | MTBE<br>(µg/L) | Toluene<br>(µg/L) | m,p-Xylene<br>(µg/L) | o-Xylene<br>(µg/L) | Xylenes, Total<br>(µg/L) |
|-------------------------------|----------|-------------------|------------------------|----------------|-------------------|----------------------|--------------------|--------------------------|
| HMW-025                       | 01/29/15 | 2.8               | 1.6                    | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | 5.4 J                    |
| HMW-025 Dup                   | 01/29/15 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | 2.3 J                    |
| HMW-025                       | 05/27/15 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-025                       | 09/22/15 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-025                       | 12/15/15 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-025                       | 03/29/16 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-026                       | 01/29/15 | ND(2.0)           | 1.0 J                  | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | 2.6 J                    |
| HMW-026                       | 05/27/15 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-026 Dup                   | 05/27/15 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-026                       | 09/22/15 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-026                       | 12/15/15 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-026                       | 03/29/16 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-027                       | 01/29/15 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | 2.3 J                    |
| HMW-027                       | 05/27/15 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-027                       | 09/22/15 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-027 Dup                   | 09/22/15 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-027                       | 12/15/15 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-027                       | 03/29/16 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-028                       | 01/29/15 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | 1.8 J                    |
| HMW-028                       | 05/28/15 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-028                       | 09/22/15 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-028                       | 12/15/15 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-028 Dup                   | 12/15/15 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-028                       | 03/29/16 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-029                       | 01/29/15 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | 1.4 J                    |
| HMW-029                       | 05/28/15 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-029                       | 09/22/15 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-029                       | 12/15/15 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-029                       | 03/29/16 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| HMW-029 Dup                   | 03/29/16 | ND(2.0)           | ND(1.0)                | ND(2.0)        | ND(1.0)           | ND(5.0)              | ND(5.0)            | ND(5.0)                  |
| Tier 1 Class GRO <sup>1</sup> |          | 5.0               | 700                    | 70             | 1,000             | NA                   | NA                 | 10,000                   |

Notes:

<sup>1</sup> Tier 1 Class Groundwater Remediation Objectives from Illinois EPA's Tiered Approach to Corrective Action Objectives (35 IAC Part 742)

Dup - duplicate sample

MTBE - methyl tert-butyl ether

J - estimated value

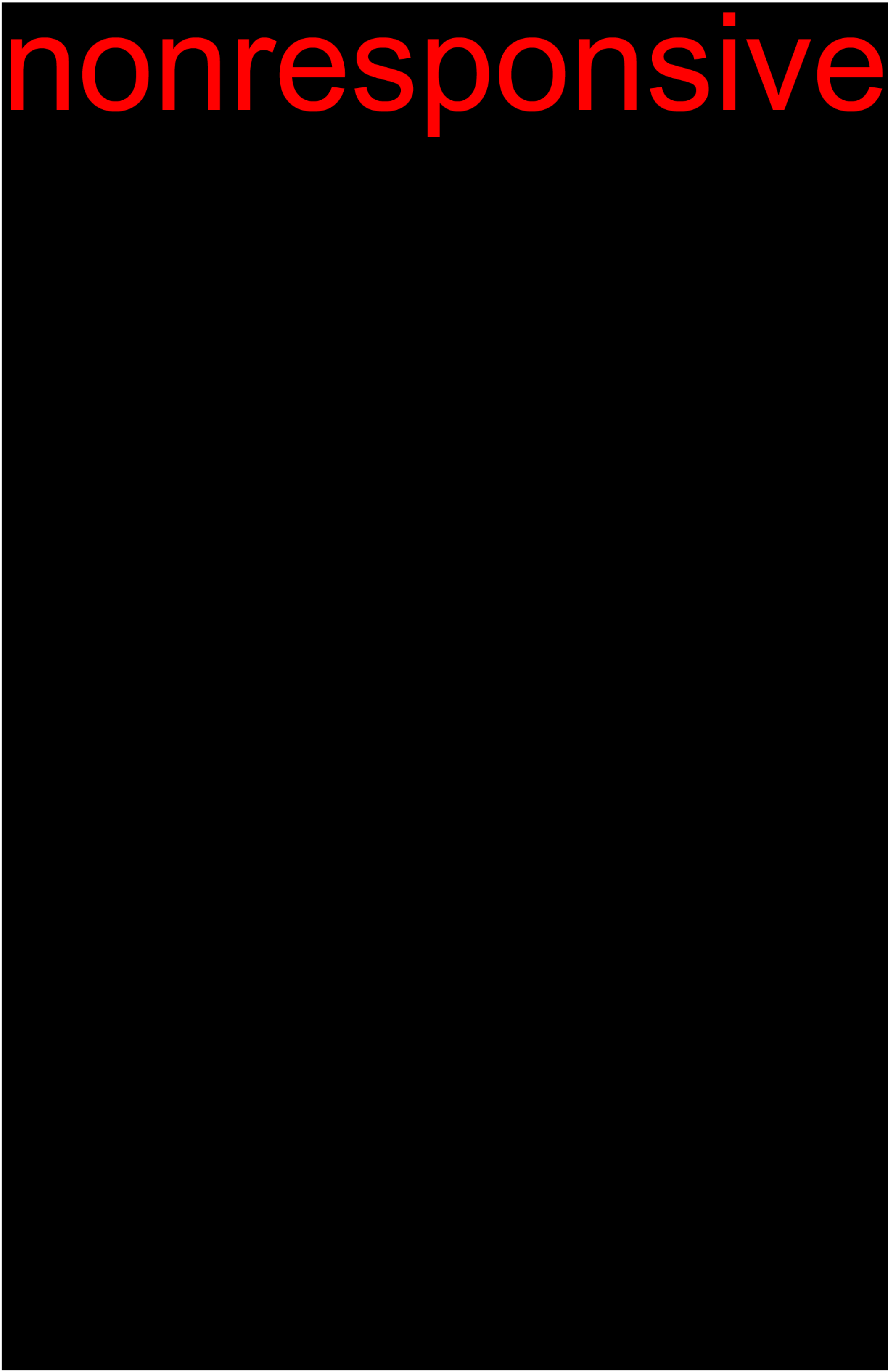
ND(1.0) - non detect at the indicated reporting limit

NA - not applicable

µg/L - micrograms per liter

## FIGURES





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**ATTACHMENT A**

**(PLEASE SEE ATTACHED CD)**

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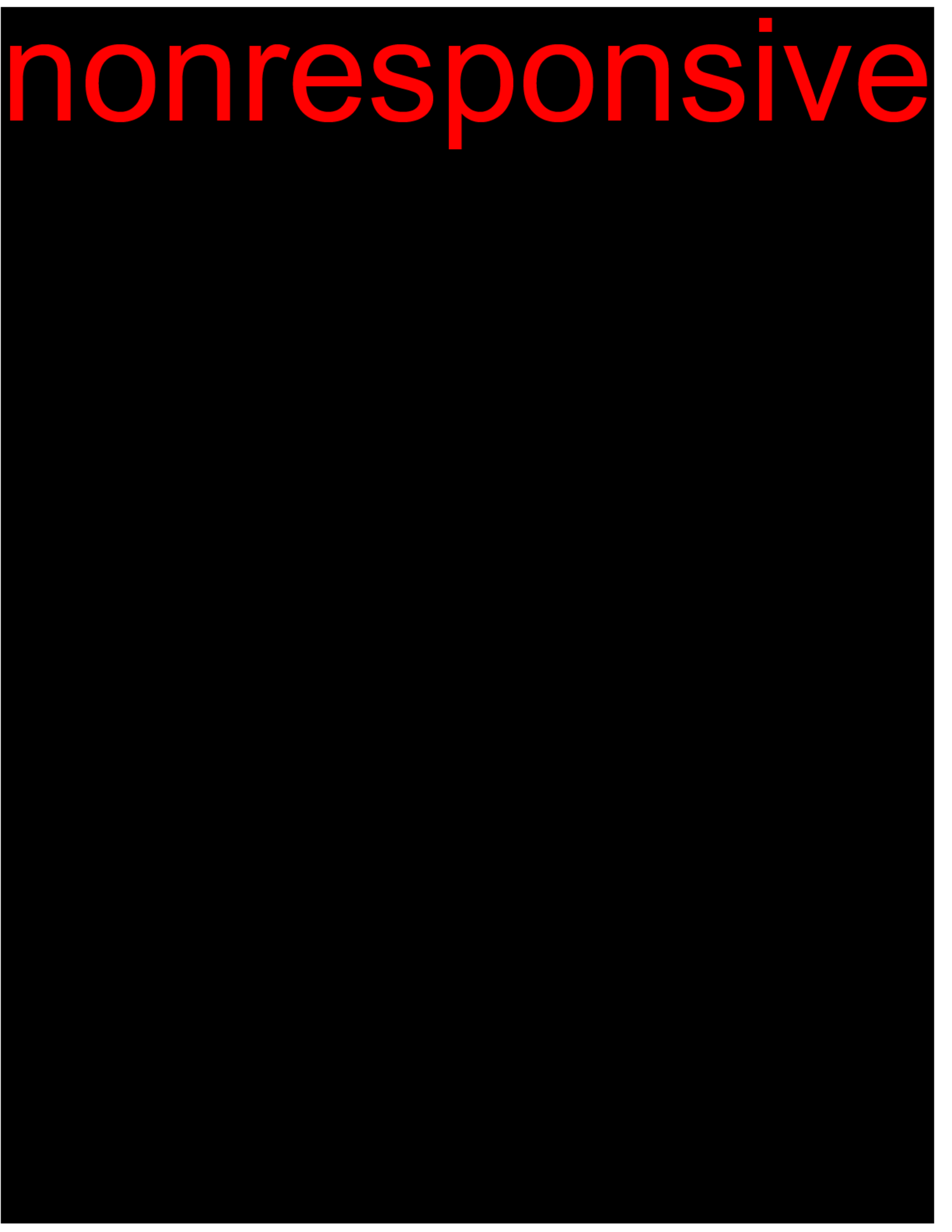


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